We Claim:

1. A dispersion management device which produces gain for an optical signal comprising;
a mode transformer;
a high order mode dispersion compensating fiber in optical communication with a first port of said mode transformer;
a trim fiber in optical communication with a second port of said mode transformer, and a Raman pump in optical communication with said trim fiber;
whereby said Raman pump produces gain in an optical signal propagating in said trim fiber, and whereby said gain exceeds any losses incurred in said mode transformer and said high order mode dispersion compensating fiber thereby producing a net gain for said optical signal.

2. The dispersion management device of claim 1 further comprising a wavelength division multiplexer optically connecting said Raman pump to said trim fiber.

3. The dispersion management device of claim 1 whereby said net gain is at least 5 dB.

4. The dispersion management device of claim 1 whereby said Raman pump comprises multiple pump sources, the power of each of said multiple pump sources being independently controllable.

5. The dispersion management device of claim 4 wherein the power and wavelength of said multiple sources are independently controlled so as to maintain a predetermined design gain shape.

6. The dispersion management device of claim 1 wherein said trim fiber is a reverse dispersion fiber.

7. The dispersion management device of claim 1 wherein said trim fiber is a non-zero dispersion shifted fiber.

8. The dispersion management device of claim 1 wherein said trim fiber is a dispersion shifted fiber.

9. The dispersion management device of claim 1 wherein said mode transformer is a transverse mode transformer.

10. The dispersion management device of claim 1 wherein said mode transformer is a longitudinal mode transformer.

11. A method of dispersion management exhibiting gain for an optical signal, said method comprising the steps of;
supplying a mode transformer;
supplying a high order mode dispersion compensating fiber in optical communication with a first port of said mode transformer;
supplying a trim fiber in optical communication with a second port of said mode transformer;

supplying a Raman pump in optical communication with said trim fiber;

pumping said trim fiber with energy from said Raman pump to produce gain in an optical signal propagating in said trim fiber,

whereby said gain exceeds any losses incurred in said mode transformer and said high order mode dispersion compensating fiber, thereby producing a net gain for said optical signal.

12. The method of claim 10 further comprising the step of supplying a wavelength division multiplexer optically connecting said Raman pump to said trim fiber.

13. The method of claim 10 whereby said net gain is at least 5 dB.

14. The method of claim 10 whereby said Raman pump comprises multiple pump sources, the power output of each of said multiple pump sources being independently controllable.

15. The method of claim 14 whereby the power and wavelength of said multiple sources are independently controlled so as to maintain a predetermined design gain shape.

16. The method of claim 10 wherein said trim fiber is a reverse dispersion fiber.

17. The method of claim 10 wherein said trim fiber is a non-zero dispersion shifted fiber.

18. The method of claim 10 wherein said trim fiber is a dispersion shifted fiber.

19. The method of claim 10 wherein said mode transformer is a transverse mode transformer.

20. The method of claim 10 wherein said mode transformer is a longitudinal mode transformer.